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# Self-Organization and -Synchronization at the Edge: Situated Action, Identity and Improvisation

Organizational Issues Track

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**Abstract**

Self-organization and self-synchronization represent key capabilities for Edge organizations. However, roughly a century of organizations research indicates that self-organization leads often to a lack of complementary action, or even chaos, and that coherent self-synchronization is extremely difficult to achieve in organizations of the scale and complexity envisioned for Edge operations. Indeed, a major role of hierarchical organization—the antithesis of Edge—is to enable effective organization and coherent synchronization of people's activities. However, the majority of research and thinking reflects teleological action in a rational-cognitive framework, in which actors plan and decide before acting. This is incommensurate with the kinds of fluid, rapid, dynamic and often-unpredictable mission-environmental contexts envisioned for Edge organizations. In contrast, the research described in this paper takes a non-teleological, situated-action perspective to develop a basis for self-organization and –synchronization in an Edge organizational context. Such contrasting perspective examines how agents respond to emergent problems and contingencies without the benefit of clear goals or planning, and assumes that organizational members must act often without full awareness of consequences or articulation of purposes. Through extensive literature review (e.g., including pragmatic philosophy, phenomenological philosophy and practice theory), we show how a teleological view of action constrains the dynamics of improvisation, which are critical for self-organization and –synchronization, and how the corresponding identity construction delimits action and improvisational repertoires. We explain why a shift toward self-organization and –synchronization at the Edge requires a non-teleological view of action, and corresponding approaches to organizational design and transformation: such shift marks fundamental identity change. The article leverages this theoretical understanding to illustrate how a Hierarchy organization can "move" to develop into an Edge. In particular, we articulate a set of maxims stemming from the theoretical integration, and then outline a three-phase approach to creating an Edge organization—an approach that enables its emergence, and supports its growth into and effective operational resource. This leads to important implications and guidelines for C2 policy and practice, as well as continued research, associated with Edge organizations.

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## Introduction

Research on Edge organizations proposes a radical alternative to bureaucratic organizational design (Alberts and Hayes 2003). Edge organizations are conceptualized to be particularly appropriate in the

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14. ABSTRACT

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context of modern military warfare, capitalizing upon fully connected, geographically distributed, organizational participants by moving knowledge and power to the edges of organizations (Nissen 2005). This highlights promising opportunities for enterprise efficacy, but it also raises issues in terms of comparative performance with respect to alternate organizational designs. Modern military organizations in general have adapted and evolved over many centuries and millennia, respectively. Hierarchical command and control (C2) organizations in particular have been refined longitudinally (e.g., through iterative combat, training and doctrinal development) to become very reliable and effective at the missions they were designed to accomplish.

Perhaps the most unique features conceptualized for Edge organizations pertain to self-organization and self-synchronization, along with emergent leadership (Alberts and Hayes 2003). Self-organization implies that relatively small and independent organizational units will be able to sense the need to come together as larger organizations with complementary capabilities specific to address a particular mission and environmental context—requiring often the agility to improvise and respond on the spot to respond to emergent, ad-hoc or ill-formed problems and contingencies without preplanning or hierarchical direction—and then disband into their relatively small and independent organizational units. This takes on many aspects of dispersed, virtual organization (e.g., see Davidow and Malone 1992), and is difficult to accomplish well in practice. Self-synchronization implies moreover that such relatively small and independent organizational units will be able to operate coherently during mission performance—again, without preplanning or hierarchical direction—and with the agility to improvise on pre-existing routines to suit the unpredictable exigencies of dynamic situations. This takes on many aspects of fluid, highly decentralized organization (e.g., see the Adhocracy in Mintzberg 1979), and likewise is difficult to accomplish well in practice.

Indeed, roughly a century of organizations research indicates that self-organization leads often to a lack of complementary action, or even chaos, and that coherent self-synchronization is extremely difficult to achieve in organizations of the scale and complexity envisioned for Edge operations. A major role of hierarchical organization—the antithesis of Edge—is to enable complementary organization and coherent synchronization of activities. This reinforces doubts about the feasibility of Edge organization. Although the Edge has been established theoretically now as a distinct organizational form (Nissen 2005, Orr and Nissen 2006, Nissen *CMOT* 2007), and demonstrated empirically to offer advantages over the Hierarchy and other forms (Orr and Nissen 2006, Looney and Nissen 2006, Gateau et al. 2007), applicable examples—much less exemplars—in practice remain elusive. References to soccer teams, open-source software development projects and faculty research collaborations are insightful, but they do not analogize directly to the military domain, and special forces units lack the kind of meritocracy and emergent leadership conceptualized for Edge organization. Hence a major issue pertains to how one would create, develop or change into an Edge organization.

The majority of research and thinking to inform such issue reflects teleological action in a rational-cognitive framework. This implies that organizational actors plan and decide before acting. This is incommensurate with the kinds of fluid, rapid, dynamic and often-unpredictable mission-environmental contexts envisioned for Edge organizations. There is another perspective that needs to be more clearly understood: the situated-action perspective. A situated-action perspective assumes that organizational members must sometimes act without full awareness of consequences or full articulation of purposes. Research that focuses on the redistribution of improvisation rights would allow us to notice actors fabricating and inventing novel responses without a pre-scripted plan and without certainty of outcomes, discovering the future that their action creates as it unfolds.

The research described in this paper takes a non-teleological, situated-action perspective to develop a basis for self-organization and –synchronization in an Edge organizational context. Such contrasting perspective examines how agents respond to emergent problems and contingencies without the benefit of clear goals or planning, and assumes that organizational members must act often without full awareness of consequences or articulation of purposes. We seek to understand how and under what conditions members of edge-like organizations can improvise and respond on the spot to ad hoc or ill formed problems. This approach to organizing calls for a different theory of action and identity formation. The situated-action framework proposes under conditions of radical uncertainty, actors rarely have time or

resources to analyze or create adequate predictive models of ends-oriented action. Actors are more likely to experiment and move quickly without the benefit of predictive rationality. This notion follows the Weickian dictum of doing by discovering: "How can I know how to act until I see what I do?" (Weick, 1998).

Further, the concepts of improvisation and situated action involve inevitably questions of identity. When people confront unexpected situations, identity questions are triggered as people wonder who they are and what matters. As they act and notice cues and triggers that enhance a sense of self efficacy, how do they frame streams of action that they then commit to? How do agents create, maintain, and transform identity as they respond to contingent situations? Through extensive literature review (e.g., including pragmatic philosophy, phenomenological philosophy and practice theory), we show how a teleological view of action constrains the dynamics of improvisation, which are critical for self-organization and –synchronization, and how the corresponding identity construction delimits action and improvisational repertoires. We explain why a shift toward self-organization and –synchronization at the Edge requires a non-teleological view of action, and corresponding approaches to organizational design and transformation: such shift marks fundamental identity change.

Identity sits at the core of human action. Where people—particularly in the Military—*identify* with hierarchical organization, centralized authority, formalized roles, relatively large and stable organizational units, relatively predictable missions and familiar environments, long and rigid chains of command, and ubiquitous, doctrinal emphasis upon rational planning before action, establishing an Edge organization does not appear to be feasible. Alternatively, where one can modify such identity, and alter the nature of the organization to reinforce edge-like activities and behavior, we propose that Edge organizations can be *grown* to reflect the kind of emergent leadership, self-organization and self-synchronization envisioned. The article leverages this theoretical understanding to illustrate how a Hierarchy organization can "move" to develop into an Edge. This leads to important implications and guidelines for C2 policy and practice, as well as continued research, associated with Edge organizations.

**Key Literature**

We begin by reviewing literature that addresses the nature of non-teleological action, i.e., action that is emergent and guided by discovery more than planning. This literature spans several fields including anthropology, sociology, psychology, philosophy and organizational behavior. To date, this literature has not been integrated, and such integration represents one contribution of this article. In particular, we review non-teleological approaches to action, including practice theory (especially Bourdieu and Giddens ), situated action theory, pragmatic philosophy (including the work of Dewey, Pearce, and Joas) and phenomenological philosophy (especially the work of Merleu-Ponty ).

***Purposive-rational action***

The rational actor model has become the most predominant paradigm for understanding human action. First gaining prominence in the field of economics, it has extended into other social science disciplines. This model assumes accurate information and perception, ability to notice and weigh feasible alternatives, clarity of goals. Rational choice theory is linked with utilitarian approaches to social action, and is grounded in the purposive, instrumental, calculating orientations that individuals bring to situations. The individual actor in this view weighs option and chooses the one that maximizes utility, engaging in what Weber called "purposively rational action." This has generated several bodies of empirical research that highlight the subjective processes involved in predicting individual choices. This view, however, does not help us to notice the changing social dynamics that actors cope with as they construe and enact novel responses.

March and Simon (1958) challenged the rational actor model of decision making; they considered situations that are novel, poorly defined, and for which no clear goal or no procedure exists for finding a solution. This "bounded rationality" perspective assumes that people have limited time, information, and resources, that organizational and social constraints limit the potential for fully rational solutions. This model of decision making assumes that constraints create conditions of bounded rationality, that there is usually disagreement about goals and priorities, that decision making is political, that managers form

coalitions and through political processes arrive at goals and priorities; and satisfice (that is, look around for quick solutions in the immediate, local environment rather than searching for the optimal solution) rather than optimize.

The bounded rationality model emphasizes habit in explaining choice making and behaviors. This helps to explain the persistence of behaviors and routines, but does not address the initiation of new behaviors. It helps to explain when and how engineering interventions are appropriate too. But because such bounded rationality model does not focus on the process that surrounds bounded rationality, it is not useful for understanding the dynamics of radical change, for understanding how people adjust to radically changing circumstances. Also, it is limited to individual frames of reference, and does not account for the process by which choices are considered and made. In rational actor and bounded rationality models, means-ends schemas of intentionality predominate; action is seen as the pursuit of pre-established goals or preferences. Perception of the world is a given and it is seen as separate from ensuing action. Actions are chosen from alternative scenarios. Individuals bracket, interpret, and evaluate choices. The emphasis is on the choice of means to attain pre-conceived goals.

Our contention here is that rationality is a limited perspective in that there is a tendency to favor persistence and stability over change, fails to account for social phenomena involved in change; favors constructs like intent and performance and renders others as non-rational or irrational; tends to notice routine, deliberate, mechanical episodes or punctuated chapters marked off by goals and implementation; fails to account for novelty and unpredictability and creativity of human action.

***Challenging the Purposive-rational actor view: Practice theory***

One school that challenges the purposive-rational actor view is the area of “practice theory.” The most influential theorists in this stream are Bourdieu and Giddens who point to the formative role of past routines and “habitus” in shaping the background of experience and how it constrains and facilitates action. Theorists of "practice" such as Bourdieu (1977; Bourdieu and Wacquant 1992) and Giddens (1979, 1984) draw upon phenomenology and pragmatism to seek to explain social reproduction, routine activity, and the role of agency. Bourdieu, invokes the Aristotelian idea of *habitus*, a "durably inculcated" assemblage of categories that become part of the background of lived experience. In Bourdieu’s theory, social actors develop embodied, tacit, pre-conscious expectations ("intentionless intentions") that guide action. Usually these assumptions remain tacit background and in this sense Bourdieu’s concepts link to threads we will explore further below, the pragmatism of Dewey and the phenomenology of Merleu-Ponty: "The theory of practical sense presents many similarities with theories, such as Dewey's, that grant a central role to the notion of habit, understood as an active and creative relation to the world" (Bourdieu and Wacquant 1992, p.122).

Giddens’ structuration theory is concerned with the relationship between agency, action and background structures (Giddens 1979). For Giddens action and structure are recursively related. Structure is created and recreated by action; action is constrained or enabled by structure. Giddens structures are not apriori or independent: they are enacted, changed, modified by action. For Giddens, interpretive schemes organize shared fundamental assumptions about the world; they organize the way actors construe meaning, understand events and experiences, serve as templates that allow individuals to process incoming information efficiently, to notice, select, remember, learn and extrapolate whole gestalts from partial data. They are the basis upon which individuals organize beliefs, values, preferences, and meanings into structures of knowledge.

Following Giddens (1979), these shared interpretive schemas are necessary for people to live with a sense of ontological security, predictability, and trust. As organization members share contexts of interaction, they develop common stocks of knowledge that contain deep shared assumptions in regard to how to act, feel, communicate, interact, negotiate meanings, and interpret situations (Giddens, 1979; Schutz, 1972). The background of mutual understanding and the basic orientation that members share, form "the core of mutual knowledge whereby an accountable universe of meaning is sustained through and in processes of interaction" (Giddens, 1979, p. 83). The accountable universe of meaning that allow actors to act and interpret meaningfully grants a sense of ontological security, a sense of being in a safe and

predictable world in which one securely knows, even though it is largely at a tacit level, what kind of actions and gestures are appropriate and what to anticipate from others within the same accountable universe. By embodying assumptions in regard to the carrying out of roles, the following of orders, the making and granting of requests, etc. they provide stability and predictability by allowing members to sustain meaning and continuity within changing interactive situations. Although interpretive repertoires are largely tacit and remain part of the routine background, members can often "unravel the reasons that lie behind their purposes and intentions" (Giddens, 1984) through categories available to them within the common stock of knowledge. Routine practices allow actors to reduce complexity, lend self reflexive meaning to action, create "basic trust" and "ontological security." Actors routinize their practices to lend a sense of stability to their relationships, especially in face of the postmodern complexity and diversity (Giddens 1991).

Thus, while they are not always consciously articulate when routines are engaged, regulation of routines is possible through “practical consciousness,” a phrase that resonates with Aristotle’s notion of practical wisdom – the tacit awareness that one is doing the right thing, in the right way, at the right time – actors are not dupes. They draw upon rules and resources as they reproduce or transform the structures that recursively guide and constrain actions. Various situations trigger possible interpretations of actions, a point we will explore below.

***Situated Action***

Closely related to the school of practice theory is situated action theory. Theorists including Suchman, Lave and Wegner, Huchins propose situated action as an approach that does not focus on the internal cognitive state of the agent, but rather on the relationship between the subject and the situation. Following Conein and Jacopin (1994), “the organization of action is understood as a system emerging in situ from the dynamic of interactions” (p. 476). Drawing upon sociology, particularly ethnographers, Suchman (1987) was the first to explore situated action. Suchman noticed that the way subjects carry out tasks in laboratories is very different from the way they do so in situ.

Recall that the purposive – rational view of intentional action assumes that the agent uses sense data to assess the current state and deductively creates a formal plan that changes the current state into the intended state. The plan symbolically constructed before action and is executed until the goal is achieved. The emphasis is on the agent’s ability to build an abstract model of the world in his / her head. The theories we have been exploring address the question that purposive action theory does not – that is, how do we account for ongoing, habitual activity? This theory fails to explain how subjects act in situations in which they are thrown embodied, when there is no time for deliberative reflections.

In situation theory, the environment plays an active role and in this sense is consistent with Bourdieu and Gidden’s theory of structuration. The agent responds to details in the environment and the environment changes as the agent acts. Situated action is “the view that every course of action depends in essential ways upon its material and social circumstances. Rather than attempting to abstract action away from its circumstances and represent it as a rational plan, the approach is to study how people use their circumstances to achieve intelligent action” (Suchman, 1987, p. 50). The plan does have a function: it is used a resource used as an orienting device or serves as a retrospective account after the action is accomplished. Action emerges from the situation at hand. Like the indexicality of language, action assumes meaning through circumstances, through dynamic interaction with others systems of words and deeds as situations arise. Situated action theory is concerned with investigating” how people produce and find evidence for plans in the course of situated action.” Suchman (1987) gives an example of going over the falls in a canoe:

> in planning to run a series of rapids in a canoe, one is very likely to sit for a while above the falls and plan one's decent. The plan might go something like "I'll get as far over to the left as possible, try to make it between those two large rocks, then backferry hard to the right to make it around that next bunch." A great deal of deliberation, discussion, simulation, and reconstruction may go into such a plan. But, however detailed, the plan stops short of the actual business of getting your canoe through

> the falls. When it really comes down to the details of responding to currents and handling a canoe, you effectively abandon the plan and fall back on whatever embodied skills are available to you.

People construct their plans as they go along, like bricoleurs, altering their moves as they go forward, discovering action possibilities as they proceed. Suchman (1987) states that "we generally do not anticipate alternative courses of action, or their consequences, until *some* course of action is already under way."

***Pragmatic theories of action***

Perhaps the most explicit criticism of the shortcomings of purposive-rational action comes from the pragmatists – including Dewey, Mead, and more recently, Joas. Joas (1992) highlights the shortcomings of teleological views of action and how traditionally action is seen as purposive, having prior goals; cognition is divorced from action; assumes the actor's capacity to exercise rational control over his / her body; views humans as autonomous agents. Pragmatist theorists focus on the situation rather than the internal cognitive choices of the actor. Actions are not conceived as following predetermined goals; rather "ends in view" emerge out of situations, from judgments and assumptions about the dynamic situation. Non-teleological view of action tends to notice how situations are bracketed, interpreted, and defined in relation to capacities for action. From this perspective, actors test out and revise courses of action as each "end-in-view" becomes a possible trigger for further "ends in view." Means and ends are not separable, but intermingled. Goal setting does occur, but is often result of breakdown or is retrospective label applied after action.

Joas (1992) contends that purposive-rational view of action tends to downplay creative action and improvisation. How does the pragmatist paradigm challenge the teleological view of intentionality, the purposive, utilitarian control of the body, individual autonomy? Intention is continually emergent in a dynamic process of means, ends, and context (framework, situation, background circumstances or framework); the body is not only an instrumental means to accomplish goals, but rather is a "source" of impulses to action, and finally, identity emerges through the process of social interaction. This pragmatist view involves an appreciation of the role of social dynamics and group dynamics in shaping self-identity; an appreciation of corporeality – the body's capabilities, habits, and ways of relating to situation and form the background that allow "ends-in-view" to emerge; the key role of the situation. Conscious goal-setting does occur, but it is the result of a breakdown in situation in which the actor can no longer continue to pre-reflectively pursue forms of action. Often, goal setting emerges when reflection is triggered within situations in which one has been acting on a pre-reflective level. Motives, goals, and plans are the products of these situations in which reflection must be engaged.

The pragmatic view highlights the temporal dimension of meaning construction. These theories help us to notice how individuals imagine new projects when taken for granted background routines are disrupted and no longer sufficient to resolve emerging dilemmas. Dewey explores the role of future time perspective in these moments: "Experience in its vital form is experimental, an effort to change the given; it is characterized by projection, by reaching forward into the unknown; connection with the future is its salient trait" (Dewey, 1981, p 61). Human intelligence, he contends, is concerned with the ability to "read future results in present on-goings" (Dewey, 1981, p 69).

Purposive rational and normative theories of action privilege the individual as autonomous agent while pragmatist views of action highlight the social relationships and dynamics, how identity emerges within the configuration and ensemble of social relations and exchanges. Rational-purposive and normative views of action see the body as being under the instrumental control of the mind. However, the body can be the source of feelings and incitements to action; a pragmatist approach includes notions of emotion, intuition, vague and inarticulate nascent impulses, contextual awareness of the body's arrangement, moving through space. These impulses can become intention, but do not begin in such a form.

***Phenomenological approach: Merleau-Ponty and corporeality***

Heidegger also challenged the Cartesian approach that assumes an internal rational agent separate from the objective world (Heidegger, 1929). Heidegger abandons the notion of knowledge as internal representations within the mind; the focus is "being-in-the-world," the pre reflective activity in which we

find ourselves absorbed. The context, the referential totality precedes awareness of any isolated object. Rather than seeing humans as primarily goal-setting agents, for Heidegger absorbed coping is the primary way of "being in the world: reflection and deliberation occur only after there is a breakdown of absorbed coping. As one becomes competent, techniques, rules, explicit skills become background familiarity. Heidegger wants to do away with this notion of the human mind as made up of rules or programs. The basic level of being for Heidegger is non reflective, absorbed engagement and routine action; so a fighter pilot engaged in flying a sortie is not consciously following rules; it is not consciousness that matters for Heidegger, it is skillful activity in which consciousness of rules withdraws and becomes background material. One cannot separate agent from world; person exists in holistic relation to the totality of equipment and becomes conscious of separate tools only when there is a breakdown ("unready to hand" mode).

Merleau Ponty (1962) built upon Heidegger's ontology; perception for Merleau Ponty is not a matter of passive, ocular reception of sense data, but involves the entire "body schema." He addresses the question of how we come to have a stable grip on the world. What are perceived as stable objects are composed by one's bodily response. When Merleau-Ponty writes "I am my body," he objects to the traditional notion that the mind is passive sensory receptor of things in the world. Like his mentor Heidegger, he argues against the Cartesian dualism that plots mind as separate and distinct from body. The body is not just an object for the reflection of mind or a tool to respond to the mind's direction. Embodiment is constitutive of perception and cognition. For him, the perceiving mind is the body incarnated. Embodiment in the world, the body-subject as perception, reconstructs things intentionally through pre-reflective understanding of world. It is through the body that we have access to the world. Body is a condition of experience, part of the perpetual openness to the world: "Insofar as I have hands, feet; a body, I sustain around me intentions which are not dependent on my decisions and which affect my surroundings in a way that I do not choose" (1962, p. 440). Objects we perceive in the world are always of a certain kind and in relation to some human intention. Perception in this sense is "creative receptivity."

How does perception come to constitute the body's involvement in the world? Through skills and habits. We experience the world through the "I can," an orientation towards projects and aspects of the world based on our capacity. This is an important insight for social researchers: the way things in the world show up to us is partially dependent on our skills and habits. The body seeks stability through skillful coping, what he calls "habituality." The aspects of an object revealed to a body-subject are dependent upon their bodily position and upon the individual's degree of skillful coping.

As an example of the way the subject-body develops intelligence and skill and objects in the world "show up" in particular ways, he cites examples from sports.

> For the player in action the football field is not an 'object', that is, the ideal term which can give rise to a multiplicity of perspectival views and remain equivalent under its apparent transformations. It is pervaded with lines of force (the 'yard lines'; those which demarcate the penalty area) and articulated in sectors (for example, the 'openings' between the adversaries) which call for a certain mode of action and which initiate and guide the action as if the player were unaware of it. The field itself is not given to him, but present as the immanent term of his practical intentions; the player becomes one with it and feels the direction of the goal, for example just as immediately as the vertical and horizontal planes of his own body" (SB 168).

In this example, perception does not involve a detached, cognitive reflection or a move of interpretation separate from activity, does not require a subject who is aware of pitching the football. This hints at the form of interaction that Merleau-Ponty feels informs most of our everyday activity. As we become more skillful in a variety of scenarios, the world shows up in a way that draws upon those skills. In contrast to the predominance of rational ego or the thinking "I" seeking pleasure or motivation, or reflecting on action, for Merleau-Ponty, the body tries to form an *intentional arc*. As he puts it, "the body will draw to itself the intentional threads which bind it to its surroundings and finally will reveal to us the perceiving subject as the perceived world" (1962, p. 453). In other words, as embodied agents our successful encounters and mastery of execution of tasks continually augments, cultivates, and enhances how objects and situations show up.

Our perceptions and actions then guide us to seek a “maximal grip,” are habitual and make sense as responses within the context of a particular community. In this sense, Merleau-Ponty is particularly applicable for understanding the shift from bureaucracy to edge because he is ultimately concerned with the act of learning and how it is that people notice the appropriate thing to do. He criticizes the traditions of empiricism and intellectualism because “neither can grasp consciousness in the act of learning, and that neither attaches due importance to that circumscribed ignorance, that still empty but always determinate intention which is attention itself" (1962, p. 28). As we develop sets of embodied sills, we encounter more situations that call upon us to act, draw us into reacting to certain situations, enables our successful coping in ways that do not demand reflective goal oriented thought. Dreyfus calls this “embodied solicitations to act.” How does a person transition from “command and control” situation to an edge like situation? In edge organizations an agent sees the appropriate thing to do in a way that is nuanced differently than if he / she were in a bureaucratic situation. Seeing the appropriate thing to do involves responding without deliberation and does not assume knowledge that can be conceptually articulated.

What does it mean to propose that we learn skills not from reflection and purposive thought, but through repeated embodied attempts? The body in this sense develops an intelligence. This is the way in which understanding the process of learning does not require a theory of passive perception or interpretation. Learning habits "is knowledge in the hands, which is forthcoming only when bodily effort is made, and cannot be formulated in detachment from that effort" (1962, p.144). Mastery allows us to perform an action without conscious reflection and yet still said to constitute embodied intelligence. The body renders phenomena intelligible. We see opportunities for action based upon the build up of embodied experiences. Our skilful embodiment makes it possible for us to encounter "more and more differentiated solicitations to act", and enables us to react to situations, in ways that have previously proved successful, and which do not require purposive thought.

> We said earlier that it is the body which "understands" in the acquisition of habituality. This way of putting it will appear absurd, if understanding is subsuming a sense datum under an idea, and if the body is an object. But the phenomenon of habituality is just what prompts us to revise our notion of "understand" and our notion of the body. To understand is to experience harmony between what we aim at and what is given, between the intention and the performance - and the body is our anchorage in the world (1962, p. 144).

This is the intentional arc -- knowledge and understanding in “harmony” between what we intend and what we do. Knowledge and consciousness are primarily not a matter of "I think that", but of "I can" (1962, p. 137). Action here is seen as spontaneous and practical, and not to be understood as part of a mind-body distinction (PP 145). Most of the time, we act spontaneously and pre-reflectively in accord with embodied skill.

***Learning as embodied skill acquisition***

From this perspective, how does one learn and how does one acquire skills? Merleau Ponty articulates how expertise acquired second nature. Dreyfus draws upon Merleau Ponty to posit a skill learning model that demonstrates how and why affordances show up for novices and competent performers differently than they do for experts. As beginners we consciously follow rules; however these rules become like training wheels and we set them aside. To become an expert, one switches from a detached reflection of rules to a more involved and specific way of coping. Dreyfus cites a study of student nurses who remain detached and follow rules but never progress beyond competence; those who become emotionally involved and take their successes and failures to hear develop into experts (Benner, P. 1996). If something goes amiss, then one is less likely to develop expertise if the instinct is to assume a disinterested involvement and devise intricate rules to guard against future mistakes; expertise is more likely to develop if one stays involved and feels the impact of successes and failures. Emotional involvement might be necessary to evolve from a detached beginner to an involved and engaged holistic experience (Dreyfus, 2005 APA address). Enhanced involvement sharpens perceptual ability to notice nuances. When chess Grandmaster plays lightning chess at world class level, there is little reflection or deliberation involved; the Grandmaster is simply responding to the situation on the board. There is no time for analysis of alternatives. Therefore, as one develops

expertise after much absorbed experience, deliberative reasons based on rules do not help much. They operate as "second nature," the basis upon which skilled coping takes place. This is why sometimes experts have trouble giving reasons for their actions: they have none other than retrospective rationalization. This is a long way of saying that a person will not become an expert at operating within edge organizations by listening to lessons or following rules of previous experts.

Following Dreyfus, Heidegger and Merleau-Ponty, embodied actors respond to affordances. Affordance is a term coined by Kurt Lewin, meaning that the perceived object is associated with some signification for action; the object is significant because it is linked to perceptual experience, including traces from previous experiences. As the object affords, or shows up in a certain way, it invites certain responses or actions. Thus food affords eating, doors afford opening and closing, etc. Again, this responsive perception is not necessarily conscious. Following Taylor, even though we respond to affordances, it does not necessarily mean that we notice them:

> As I navigate my way along the path up the hill, my mind totally absorbed in anticipating the difficult conversation I'm going to have at my destination, I treat the different features of the terrain as obstacles, sports, openings, invitations to treat more warily, or run freely and so on. Even when I'm not thinking of them these things have those relevancies for me (Taylor, 2005).

Affordances solicit us to act so that we are able to cope competently without thinking.

Dreyfus draws upon Merleu Ponty to develop a model of skill acquisition that does not rely on a rationalistic notion of plans as internal representations, in particular his notion of intentional arc, the "tight connection between the agent and the world viz. that, as the agent acquires skills, these skills are stored not as representations in the mind, but as more and more refined dispositions to respond to the solicitations (italics added) of more and more refined perceptions of the current situation." Skill acquisition occurs as the body seeks "maximum grip," the capacity to respond to solicitations in ways that bring the current situation into a gestalt sense of wholeness. Dreyfus' model of skill acquisition outlines how this intentional arc is achieved.

To summarize the points above, for Merleu Ponty, skills are acquired as ways of dealing with situations; these situations then show up for us in ways that afford our skillful response. How is our relation to the world transformed as we acquire a skill? As the following stage model shows, following context-free rules will not lead to competent performance as the beginner meets unforeseen obstacles. The learner needs to understand not only the rules and the facts, but also needs to understand context.

Stage 1: novice. The novice learns first through instruction that deconstructs the task into context-free rules. Beginning drivers learn the techniques of shifting gears, learn to attend to the speedometer, how to break at red lights, etc.

Stage 2: Advanced beginner. As the beginner improves in his capacity to cope with driving situations, he begins to notice additional aspects of the dimensions and conditions. The instructor might provide maxims to help cope with these aspects that the inexperienced novice might notice. The beginning driver learns to notice the sound of the engine, and the maxim – when the engine sounds like it is working too hard, shift up. With experience, the beginner notices lists of such features, aspects he could not have without some experience of the contexts to which a maxim might apply. The learning at this stage is still likely the detached, analytical mind applying rules and maxims, follows instructions that apply to particular examples.

Stage 3: Competence. To become a competent performer, a deeper level of involvement is called for. With increasing experience more and more aspects become salient, the learner may be overcome with the plethora of facts. To become competent, people learn to devise a plan, to choose a point of view, that focuses upon certain aspects and ignores others. As the number of features and potential signs are restricted choice is made easier. These are more complicated than the rules or maxims that beginners relied upon from manuals. There are now an overwhelming number of possible situations and features that one can look for. The competent performer chooses one perspective but not skilled enough to know if this is the

best or correct choice. Coping at this point raises anxiety because the number of options is large. As our driver become competent and seeks to make a left hand turn as someone is crossing the street, he learns to attend to the speed of the car without having to consciously shift gears, or if he hits a patch of ice, for instance. The competent learner has experiences ranging from fright to elation (depending on whether he is successful or not) partially because he is aware that he is responsible for choosing the plan for action that will account for the necessarily limited number of features in the challenging situation. At this point, the learner is emotionally invested in the choices of action. Affective involvement, according to Dreyfus, plays a role in widening the number of perspectives and developing a holistic background of awareness.

Stage 4: Proficiency. Proficiency emerges when the detached, object rule following of the beginner is replaced by involved absorption of activity. Emotional responses will heighten awareness of successful responses and handicap unsuccessful choices. The learner develops situational discernment and an awareness of differentiated and refined nuances that call for more finessed, finely tuned and precise responses. The proficient learner spontaneously sees relevant features of the situation; yet he / she still must decide what to do. The proficient driver is in a snowstorm, intuitively feels that he should brake very slowly and must decide when and how to apply brakes. The proficient driver is able to successfully negotiate the stop better than the competent driver who is monitoring speedometer, speed of other cars, etc. The proficient learner recognizes a large repertoire of possible actions and must determine consciously how to move.

Stage 5: Expertise. While the proficient performer notices many nuances, he must decide how to act. The expert has a vast repertoire of discernment and sees immediately how to respond. There is no deliberation or conscious choice making. The expert has had the experience of more refined and discriminant nuances. Having had a variety of experiences, the expert has learned which action is appropriate and affords an intuitive situational response. Hence experts do not achieve expertise by accumulating representations inside the mind; rather they are thrown into situations that are more refined discriminations, situations that show up and solicit an appropriate response. This is what Merleu-Ponty meant by the intentional arc. The subject is not a passive recipient of sense impressions; rather the situation already shows up from some perspective and affords and solicits certain repertoire of actions.

## Practical Illustration

In this section we illustrate practical application of the theoretical revelations elucidated above. We focus on the military domain, and concentrate in particular on the Global War on Terror (GWOT), a seemingly enduring endeavor that appears to call for more edge-like behavior (Nissen 2005b, Gateau et al. 2007). We begin by summarizing a set of maxims stemming from the theoretical integration above, and follow with a three-phase approach to Edge organization.

### *Maxims*

A practical contrast emerges directly from the discussion above. The teleological, rational-actor perspective emphasizes rational planning and what people *know*. Based on the rational actor model, people are taught rules and trained to the level of novices, under the assumption that performing competently in edge situations is a matter of mastering acontextual rules. This learning takes place within the Hierarchy organization at present, which sets the conditions and prescribes the activities that reinforce the identities of people working within a hierarchy. Hence what is learned is a set of skills appropriate for operating within a hierarchy. Following theories of phenomenology and skill acquisition, the organizational world – situations that call for appropriate action – show up in ways that accommodate these skills. In other words, competent actors notice nuances and situations that are consistent with their identities as skillful copers within hierarchies and are likely to not notice other situations or opportunities for action for which they lack facility.

*Maxim 1. The doing, learning and on-the-job experience required to develop edge-like behaviors must take place in an environment that encourages and reinforces such edge-like behaviors.*

The key implication: **it is infeasible to create an Edge - like behaviors from within a Hierarchical setting**.

The situated-action perspective emphasizes improvisation. People are encouraged to take risks and experiment with different approaches to problems. This implies that agents must be "thrown in" to edge like situations that require novel responses. Actors are likely not to feel comfortable, knowledgeable or competent as confusing scenarios and unfamiliar actions throw them back into relying upon sets of rules. Therefore, in the earliest stages, it is best to devise sets of fundamental edge-like rules to guide novice behavior. The irony of course is that hierarchies are explicit rule-based contexts and care must be taken to not allow actors to over rely on rules or assume that rules are a permanent fixture. Or perhaps more importantly, these rules should be obviously temporary aids which themselves should be disrupted so that learners do not assume that learning acontextual rules is adequate to attain competence in edge-like settings.

*Maxim 2. The Edge organization can emerge from the activities, dialogs and interactions of people working together in an environment that encourages and reinforces edge-like behaviors.*

The key implication: **an Edge organization can be grown only through conditions that promote edge-like behaviors**.

Not all people are likely to be equally comfortable with or effective in an environment that encourages and reinforces edge-like behaviors. Likewise, not all people are likely to be equally comfortable with or effective in bureaucratic hierarchies. This stems in part from our qualitative work as well. Some people have developed competent skills to achieve a maximum grip within edge-like environments—and hence would have a better chance of interacting in a way that leads to the emergence of Edge organization—than others are. In terms of identity, some people's identities correspond more closely with those appropriate to Edge organization—and hence would have a better chance of earlier adoption of an edge like activities. Background competence and experience in fluid environments will play a factor as some will have developed a level of skill that allows them to notice opportunities to act.

*Maxim 3. The people working together in an environment that encourages and reinforces edge-like behaviors must learn the kinds of activities, dialogs and interactions required for Edge organization.*

The key implication: since **an Edge organization can be grown only by people who identify with edge-like behaviors, in order to transition to edge-like structures it is important leaders design systems and opportunities for learning competencies in fluid, edge-like environments. Below we suggest phases of development that designers might keep in mind as they seek to support edge behaviors.**

***Three-Phase approach to Edge organization***

Integrating and building upon the three maxims and implications above, it follows that one must be willing and able to isolate appropriate people in non-hierarchical environments, and allow them time and opportunity to interact under conditions that promote trusting interrelationships, improvisation, and ultimately emergent edge-like behaviors. This leads to three, critical and practical questions that must be answered: 1) which people? 2) which conditions? and 3) which activities? Drawing in part from the diagnosis of organizational misfits and development of a transformation approach to address the GWOT challenge (see Nissen 2005b), the three-phase approach outlined here addresses these questions, and provides the leader or manager with an actionable plan to growing an Edge organization.

**Phase 1 – From Novice to Competent**. Reiterating from above for reference, the novice learns first through instruction that deconstructs the task into rules. Participants will need to be instructed on how they are expected to behave in edge-like environments, and they will need to practice adhering to the corresponding "rules" for behaving in such environments. However, these rules are offered as ironic contingencies, since developing competency and expertise involves abandoning rules.

The first step requires selecting people who are suitable for an edge-like environment, isolating a critical mass of them together—in a non-hierarchical context that will encourage and reinforce edge-like behaviors—and setting up the kinds of conditions and activities that will promote edge learning. Remember Maxim 1: *The doing, learning and on-the-job experience required to develop edge-like behaviors must take*

*place in an environment that encourages and reinforces such edge-like behaviors.* Someone from outside this environment will need to think carefully about setting up and staffing such environment. Moreover, following the expertise-development progression outlined above, people will need to develop some means to bring new participants up to Novice level relatively quickly. The suggestions in this Phase-1 description should be helpful in this regard, and could be used in conjunction with others such as training materials to sensitize participants to the kinds of behaviors deemed "edge-like" and hence encouraged.

Although substantial additional research will be required to develop clear specifications for what criteria to use for selecting such people, the Military possesses and uses many batteries of tests and profiles today to assess its personnel on the basis of leadership, independence, confidence, and other factors that may serve as proxies. These can provide a first sort through potentially appropriate personnel. Additionally, clearly there is ample opportunity to learn from experience that can be gained from experimenting with people reflecting different characteristics, and observing how well they perform in an edge-like environment. Indeed, setting up the environment and growing an Edge organization should not be thought of in teleological terms (e.g,. deliberate planning followed by execution). Rather, people responsible for setting up the edge-conducive environment will be required to improvise and learn from experience in many of the same ways that participants in the isolated environment will. Moreover, given that we do not have great knowledge about the kinds of people who will make effective Edge organization participants yet, it will be highly appropriate to incentivize people to self-select into and out of such environment; the people themselves are likely to be the best judges of their relative fit into and appropriateness for Edge organization.

This first step also requires establishing a set of conditions that will encourage and reinforce edge-like behaviors. Our theoretical understanding of the Edge organization can be useful to inform us in this regard. Fundamentally, there can be no explicit rank structure in such environment: in order for a meritocracy to develop, people must interact with one another on the basis of knowledge and expertise, not rank. Fortunately, people of higher rank tend in many cases to be more knowledgeable and experienced in certain domains, but in others—particularly those requiring narrow or quickly changing technical skills—the situation is inverted: those freshly out of college, with a current technical certification, or who completed a graduate-education program recently may have the most applicable knowledge and expertise for a particular task at hand. These are the ones who need to be encouraged to lead (and rewarded, or at least not punished, for leading)—during the time in which such knowledge and expertise are relevant—regardless of rank. As a somewhat gentle transition, participants in this environment could be encouraged to elect a leader for a given set of activities, and such leader would be authorized (encouraged and rewarded would be better) thereby to give direct orders to others. However, once such set of activities had been completed, the elected leader's charter would expire, and people would be encouraged to elect other leaders (depending upon knowledge and expertise required) for each subsequent set of activities.

Additionally, task activities must be set up in a manner that requires considerable dialogue and coordination between people. Over time, and as people develop novice-levels skills in edge-like environments, reciprocal interdependence among tasks should become increasingly high and pervasive, so that people will be required to work together as teams. Activities will need to be set up to compel the formation of teams, and multiple teams should be encouraged to devise alternate approaches to accomplishing the same tasks. From a rational-actor perspective, "assigning" multiple teams as such would clearly be viewed as "redundant," but in the context of developing edge-like behaviors, people will need to learn how to pursue multiple, simultaneous approaches, and how to conduct dialog and debate to decide among multiple, competing alternatives. Hence there should be more than just one "best way" to accomplish the activities that are selected for this environment, and such activities should be inherently complex and ambiguous enough to require substantial and sustained interaction among teammates. The incentive system should encourage individual teams to compete against one another when exploring alaternatives, but at the same time, it must reward the organization as a whole for coming together as a coherent unit—collection of units actually—to undertake whichever competing approach is selected *by the participants*; that is, unlike deliberate planning and hierarchical decision making in the Military today, in which teams of staff personnel work to develop and present alternate courses of action to decision-making commanders (i.e., hierarchy behaviors), *edge-like behavior will encourage competing teams to decide between themselves* which courses of action to take, and in turn to take such courses.

Finally, the conditions and activities should be set up to allow participants to learn and practice the kinds of edge-like skills and behaviors included at the Novice level. For instance, where participants are encouraged to elect leaders for different situations and activities, they will be reverting to *direct supervision* as a coordination mechanism, which is not the preferred edge-like mode of mutual adjustment. Here, the skill to be learned focuses on electing different leaders for different activities and situations, and then electing other leaders when such activities and situations pass. The behaviors to be practice center on different people emerging to lead on short notice and based upon skill and expertise, and them falling back into the pool of participants once the activities and situations pass. The activities selected for the organization to practice with should be sufficiently independent and clear to enable direct supervision to succeed as a coordination mechanism. For instance, direct supervision from a single leader will break down very quickly when the leader is forced to coordinate single handedly myriad different conversations, decisions and actions. The key is for the people to succeed and benefit from positive reinforcement of the skills and behaviors being learned. Returning to our driving metaphor, they must learn to start and stop the car safely at low speeds and in the absence of traffic before being tossed onto a busy freeway interchange at rush hour. Returning to our expertise-development progression from above, they must master the Novice skills before progressing to the next levels.

**Phase 2 – From Competence to Expertise Development**. The second step requires progressing through the Advanced beginner (e.g., noticing additional aspects), Competence (e.g., deeper level of involvement), Proficient (e.g., involved absorption of activity) and finally Expertise (e.g., intuitive situational response) stages. The experienced professional will think immediately to the myriad, common, expertise-development programs (e.g., to train pilots, surgeons, lawyers, other professionals) that serve well to guide people through professional development across many diverse fields. It is important to note that most such programs focus on *individuals*, however, whereas the focus here is upon *communities* of people working together to grow Edge organizations. In this respect, the most appropriate comparator is the kind of unit- or group-level training that takes place before most military deployments, augmented by the subsequent unit- and group-level experience gained on the job and in theater. The leader or manager should look to these, long-established and well-refined approaches when thinking about growing Edge organizations. It is critical to reiterate, however, that growing Edge organizations *cannot* take place within the hierarchical organizations responsible for such training and experience today.

In this second stage, the people who appear to be mapping their identities well toward the kinds required for effective edge-like behaviors should be rewarded and encouraged to remain in the isolated edge-like environment, whereas those not fitting the identity profile well should be encouraged to leave. Remember Maxim 2: *The Edge organization must be grown from the activities, dialogs and interactions of people working together in an environment that encourages and reinforces edge-like behaviors.* Remember Maxim 3 also: *The people working together in an environment that encourages and reinforces edge-like behaviors must be suited well for the kinds of activities, dialogs and interactions required for Edge organization.* Hence attention to the participants in the isolated edge-like environment will be critical. Just as fine wine is unlikely to emerge from bad grapes, an Edge organization is unlikely to emerge from people who cannot identify well and participate coherently.

The conditions and activities will need to be adjusted to push people beyond the Novice level. They should be encouraged, for instance, to dispense with formal elections of leaders, and to progress more toward the fluid emergence and submergence of leaders as necessary. This is similar to the manner in which participants is jazz bands take turns leading versus “comping” (i.e., accompanying) at various, often unpredictable but noticeable times with coherent action, or soccer players take turns dribbling the ball and taking shots on goal versus passing to and assisting others; well-adjusted soccer players do not care whether they are the ones who score goals, so long as someone on the team scores. The complexity and ambiguity of activities must increase to the point where direct supervision will suffice no longer as a coordination mechanism (e.g., where leaders exceed their bounded rationalities and become overloaded by information), and tasks must become sufficiently interdependent so that decomposition is effective no longer (e.g., where tasks become reciprocally interdependent and require mutual adjustment by those performing them). Here the rules learned as Novice will continue to apply but become insufficient for success, and people—working together in teams and as a whole organization—will require improvisation,

experimentation and practice to develop the appropriate routines. Moreover, they will require the ability to *learn how to learn* new routines, how to form into new organizational configurations, and how to coordinate new sets of activities.

Participants will need to learn to trust one another, and to merit one another's trust. They will need to learn how to debate and dialog regarding alternate approaches, and how to use persuasion as opposed to orders to make decisions, enlist volunteers, and effect actions. They will need to learn how to assemble parallel organizational units to explore alternate approaches, and how to reassemble them into coherent organizational wholes when the times for execution and improvisation come. They will need to learn the art and practice of persistent, multiparty conversations, and to tolerate substantial ambiguity, as important questions remain unanswered for extended periods of time. They will need to learn how edge-like behaviors can lead ultimately to better decisions and actions, and how the skills and expertise they accumulated through work in hierarchies fail to apply well in the edge-like environment. Their activities should become progressively more challenging, with conditions that favor progressively more edge-like behaviors for success.

People should be encouraged further to suspend their activities periodically, to reflect upon and learn from them. Participants will need to focus extensively on learning, and they will need to learn how to learn in an edge-like environment. Ironically, this may require a teleological approach involving deliberate planning followed by rational action. Unlike the kind of *action*-oriented teleological approach derided above as being improvisation-inhibiting, however, the teleological approach considered here is *learning*-oriented. Participants will reflect upon and discuss improvisational actions, plan *how to learn* from such improvisations, and attempt to incorporate such learning into future improvisations. Moreover, participants will learn to work together in diverse and shifting groups, but as a whole and coherent organization. As they are learning to work together in an edge-like environment, they will be growing such environment and causing it to emerge. This is a classic instantiation of *structuration* as discussed above; that is, by learning how to work together coherently in an edge-like environment, they will be creating such edge-like environment, and through extended conversations, dialogs and interactions, they will be causing this environment to emerge and grow. *Phase 2 ends when the organization as a whole reaches the Expertise level*. An organization that fails to reach this level should be considered a failed experiment and disbanded—followed immediately by another experiment using a different set of people, conditions and activities. Patience will be critical: by metaphor, one does not obtain a beautiful rose garden from the first seed set into the ground.

**Phase 3 – Application to operational missions**. Finally, when an organization as a whole reaches the Expertise level, demonstrating edge-like behaviors (esp. emergent leadership, self-organization and self-synchronization), it is ready for operational missions. The organization as a whole needs to be transplanted—with as much of its isolated, edge-encouraging environment as possible—into the geopolitical/theater/tactical context required for mission execution, *and it needs to be left alone*. The first hint of direct supervision from a Hierarchy offers excellent potential to cause the Edge organization to devolve quickly into a part of the hierarchy, and hence losing all of the relative advantages inherent in this alternate organizational form. Leaders and policy makers should be very careful here. There is little sense in growing Edge organizations only to kill them within hierarchies.

Leaders and policy makers will need to be patient too. The Edge organization may not succeed immediately. Indeed, it may not perform as well initially as conventional, hierarchical counterparts do. However, its power lies in its agility and its ability to learn, grow and change. Given time and support, the Edge is likely to outperform its conventional, hierarchical counterparts *on missions that are appropriate for Edge organizations*. This latter point is key. All of our theoretical and empirical research indicates consistently that the "best" organizational form is contingent upon the specific mission-environmental context. Placing an Edge organization in a mission-environmental context for which conventional, hierarchical organizations are suited well makes no sense (e.g., consider the Cold War context). Neither does it make sense to place conventional, hierarchical organizations in mission-environmental contexts for which they are not are suited well (e.g., consider the GWOT).

Finally, leaders and policy makers will need to manage the expectations and jealousies of people in both Edge and Hierarchy organizations. Promotions, rewards, incentives must be commensurate with value in both kinds of organizations, and although Edge organizations may be placed in situations where they compete with Hierarchy organizations on the same missions—clearly competition here pertains to pursing alternate courses of action—perhaps engendering resentment in one organization or another, leaders and policy makers will need to redouble efforts to ensure that both kinds of organizations—albeit very different from one another—remain always on the same side and pursue the same national and military goals. Leaders and policy makers will need to manage their own expectations and jealousies as well. Indeed, such expectations and jealousies may represent the single greatest threat to Edge organization emergence and growth. Particularly in the Military, which offers few avenues for lateral entry, leaders have invested decades of service—entire careers—in support and leadership of Hierarchy organizations; they are committed generally to such hierarchical organizations, and they have much to lose if the Hierarchy becomes recognized as an inferior organizational form for GWOT. If a leader or policy maker wishes to kill an Edge organization, then all that is required is to bring it into the Hierarchy. Alternatively, if the wish is for an Edge organization to emerge, grow and flourish, then it must be left alone.

Clearly many details remain unresolved through this research to date. However, building upon a growing and coherent body of theory and empirical evidence, we articulate a promising, three-phase approach to Edge organization: one that acknowledges the emergent nature of this organizational form, and that offers potential to help such form to grow and flourish. Much additional research is needed—theoretical and empirical alike—of course, but we have an actionable approach now: one that needs to be undertaken, explored, learned from, and refined.

**Conclusion**

Self-organization and self-synchronization represent key capabilities for Edge organizations. However, roughly a century of organizations research indicates that self-organization leads often to a lack of complementary action, or even chaos, and that coherent self-synchronization is extremely difficult to achieve in organizations of the scale and complexity envisioned for Edge operations. Indeed, a major role of hierarchical organization—the antithesis of Edge—is to enable effective organization and coherent synchronization of people's activities. However, the majority of research and thinking reflects teleological action in a rational-cognitive framework, in which actors plan and decide before acting. This is incommensurate with the kinds of fluid, rapid, dynamic and often-unpredictable mission-environmental contexts envisioned for Edge organizations.

In contrast, the research described in this paper takes a non-teleological, situated-action perspective to develop a basis for self-organization and –synchronization in an Edge organizational context. Such contrasting perspective examines how agents respond to emergent problems and contingencies without the benefit of clear goals or planning, and assumes that organizational members must act often without full awareness of consequences or articulation of purposes. Through extensive literature review (e.g., including pragmatic philosophy, phenomenological philosophy and practice theory), we show how a teleological view of action constrains the dynamics of improvisation, which are critical for self-organization and –synchronization, and how the corresponding identity construction delimits action and improvisational repertoires. We explain why a shift toward self-organization and –synchronization at the Edge requires a non-teleological view of action, and corresponding approaches to organizational design and transformation: such shift marks fundamental identity change.

The article leverages this theoretical understanding to illustrate how a Hierarchy organization can "move" to develop into an Edge. In particular, we articulate a set of maxims stemming from the theoretical integration. To re-iterate, the three maxims (and corresponding implications) include: *Maxim 1. The doing, learning and on-the-job experience required to develop edge-like behaviors must take place in an environment that encourages and reinforces such edge-like behaviors* (**it is infeasible to create an Edge organization from within a Hierarchy**); *Maxim 2. The Edge organization must be grown from the activities, dialogs and interactions of people working together in an environment that encourages and reinforces edge-like behaviors* (**an Edge organization can be grown only through conditions that promote edge-like behaviors**); and *Maxim 3. The people working together in an environment that encourages and reinforces edge-like behaviors must be suited well for the kinds of activities, dialogs and*

*interactions required for Edge organization* (**an Edge organization can be grown only by people who identify with edge-like behaviors**).

Drawing in part from the diagnosis of organizational misfits and development of a transformation approach to address the GWOT challenge (see Nissen 2005b), we then outline a three-phase approach to creating an Edge organization—an approach that enables its emergence, and supports its growth into an effective operational resource. To re-iterate, we proceed through the three phases 1) *Novice development*, 2) *Expertise development* and 3) *Transplantation*. This discussion answers the three, critical and practical questions that are prerequisite to Edge organization: 1) which people? 2) which conditions? and 3) which activities? It further provides the leader or manager with an actionable plan to growing an Edge organization. This leads to important implications and guidelines for C2 policy and practice.

This leads to opportunities for continued research on Edge organizations as well, particularly research focused on creating and growing such organizations. Notice that our use of terms such as *creating* and *growing* avoids any reference to the ubiquitous and deleterious term *transformation* that echoes hollowly throughout the Military and Government. We know well from Organization Studies, for instance research on organizational fields and population ecology (see Scott 2003), that oftentimes the best way to "transform" an organization is to create or allow to be created a completely different form that "competes" with it. Hence, we do not advocate attempting to transform any, current, hierarchical organization into an Edge. Rather, we advocate creating—and growing—one or more, alternate, edge-like organizations, and seeing—patiently—how well they perform. For the missions where such Edge organizations perform relatively better—over time—than conventional organizations do, the Edges can become responsible completely for these missions. Where the opposite result obtains, the Hierarchies can remain responsible. Where the results are mixed, both organizational forms can continue to co-exist and compete.

Clearly computational experimentation using tools such as POWER (e.g., Gateau et al. 2007) will continue to play a key role in research along these lines. It is very time-consuming and expensive to grow an Edge organization in the field, but it is very quick and cheap to model and simulate one via computer. Additionally, laboratory experimentation using tools such as ELICIT (e.g., Leweling and Nissen 2007) will play an important role also. Although more time-consuming and expensive than computational experiments, laboratory experimentation involves the participation of real people, and can be designed often to exhibit excellent external validity and generalizability through very realistic tasks and task environments. Laboratory experiments remain much quicker and cheaper also than growing Edge organizations in the field.

However, the major advances will come via fieldwork and experimentation with physical organizations. Some leaders and policy makers will need to authorize and commit to the creation and growth of at least one Edge organization, and some researchers will need to study it in the field, to learn about such organization as it emerges and grows, and to communicate such learning to leaders and policy makers as well as to other researchers. However, this paradigm suggests that communication of non-contextual guidelines and rules are limited in helping to develop competence in operating in edge-like situations to novices only. DoD leaders must acknowledge that competence and expertise do not require the kind of conscious knowledge that is often attributed. A non-teleological approach to action suggests that knowledge is not a matter of internal representation, but rather involves embodied skills. Therefore, leaders are encouraged to design learning situations that involve trial and error, experimentation, concerned active involvement. Clearly this constitutes a campaign of experimentation, one that will likely require many years to complete. But given the nature of the "long war" on global terror—and the limited gains of conventional, hierarchical, military organizations to date—there appears to be ample time to pursue this parallel approach to addressing the GWOT. As within the Edge organization itself, the pursuit of parallel approaches represents a fundamental approach to efficacy. By enabling a parallel Edge approach, little will be lost, yet the long war itself stands to be won through greater agility and learning—and hence performance and efficacy.

Moving from bureaucracy to edge involves a change in identity, a move from a sense of identity as manager / leader to influencer or facilitator. There is a strong relationship between sense of identity, sense of competence, and what cues a person is likely to notice. Managers will tend to notice and feel drawn to

respond to cues that are familiar and ones around which they have developed skills In command and control organizations managers are most likely to see change within organizations as infrequent, discontinuous, and intentional. They are more likely to construe organizational activity as goal-seeking, motivated by disequilibrium and disruptions, needing outside interventions. In terms of identity, they are more likely to see themselves as prime movers focusing on inertia that needs to be disrupted, searching for leverage points for intervention. These managers are more likely to articulate alternate schemas and visions, notice and interpret revolutionary triggers, seek to build commitment to vision, see their primary task as planning and controlling.

Within edge-like settings, managers are more likely to see change as emergent and self-organizing, constant and cumulative. As facilitators they are more likely to seek ways to redirect action already underway; more likely to notice cyclical processes without clear end states, construe change efforts as equilibrium-seeking. In terms of identity, edge managers are more likely to see themselves as choreographers who redirect change already underway, sense makers who seek to make tacit dynamics salient, reframe current patterns. These managers are more likely to believe that change can be made at the margin, seek to alter meaning by introducing novel language, attempt to enrich dialogue, translate threads of conversations between disparate groups, facilitate improvisation, see their primary task as learning and facilitating. They are more likely to pay attention to earliest attempts to initiate actions because actors test out and revise "ends in view."

What impact will these various identities have on which triggers and cues they are likely to notice and how are they likely to respond if they see themselves as facilitators of ongoing change rather than intentional leaders of infrequent and episodic change? A situated action perspective helps us notice these dynamics. Since things pre-reflectively "show up" in certain ways depending on how one's skill-set shapes perception (what Merleu Ponty calls "creative receptivity"), this would imply that events will show up differently depending on identity-construal. Managers of edge organizations will elicit embodied solicitations to act within network centric situations. One skill that needs to be developed in edge organizations involves paying attention to fleeting circumstances of action that we routinely ignore. This challenges any notion that developing edge like competence is an acontextual skill. The situated action view does not assume that everyone needs to have the same interpretation of events or meaning of actions in order to coordinate activity, don't need to share collective representation of joint actions in order to engage coordinated activity; don't even need the same interpretations of the symbol: boundary objects, for example.

Since we learn skills not from reflection, but from embodied attempts, experiments, one challenge in edge organizations will be to encourage and unblock improvisation so that agents can attempt novel actions without full awareness of their purposes. One skill that edge managers will need to foster is the capacity to span boundaries, to notice connections between the familiar and unfamiliar. Managers will learn to appreciate dialogical view of action. Albert and Hayes emphasize the importance of access to information. However, this implies that what is needed is not just access to information, but also access to conversation and dialogic exchange. Without the benefit of frame-challenging conversations, non contextual information will simply be placed within familiar frames.

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